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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/663,476

09/15/2003

Jong-Arm Jun

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EXAMINER

WONG, XAVIER S

ART UNIT

PAPER NUMBER

2616

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/663,476

Applicant(s)

JUN ET AL.

Examiner

Xavier Szewai Wong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15<sup>th</sup> Sep 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15<sup>th</sup> Sep 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date 15 Sep 2003 & 1 Aug 2005.
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

### *Priority*

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d).

Acknowledgment is made of applicant's claim for foreign priority based on applications filed in **The Republic of Korea** on 24<sup>th</sup> Dec 2002 and 3<sup>rd</sup> March 2003. It is noted, however, that applicant has not filed a certified copy of the **KR2002-83720** and **KR2003-13079** applications as required by 35 U.S.C. 119(b).

### *Information Disclosure Statements*

The information disclosure statement submitted on 15<sup>th</sup> September 2003 and 1<sup>st</sup> August 2005 have been considered by the Examiner and made of record in the application file.

### *Claim Objection*

Claim 9 is objected to because of the following informalities: "...~~(e)~~ → (h) further comprises updating the highest priority..." Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 – 3, 6 and 8 are rejected under 35 U.S.C. 102 (e) as being anticipated by **Chao et al (U.S Pat 6,667,984 B1)**.

Consider claim 1, **Chao et al** disclose a matrix switch 900 (fig. 9) comprising: N input ports/groups 910 with a number of VOQs 912 (col. 15 lines 48-50; col. 16 lines 7-8); inputting into crosspoint/crossbar chips 924 (fig. 30) and independently arbitrating input VOQ groups, and output cells (col. 16 lines 35-37; fig. 10 item 1010; fig. 11 items 910 & 1110); as well as N output ports 930 for independently arbitrating cells output from the crosspoint chips 924 and transmitting cells to output ports (col. 15 lines 51-57; col. 16 lines 18-22/31-33; fig. 10 item 1030; fig. 11 item 1120).

Consider claim 2, and as applied to claim 1, **Chao et al** show the crosspoint units 926 in figure 14A form a plurality of switch planes/modules 922 in figure 9 (col. 15 lines 54-57); the switch module comprises output port that include buffer for storing predetermined cell in the output port (col. 16 lines 6-9; col. 18 lines 40-49; fig. 13 sect. 1304).

Consider claim 3, and as applied to claim 1, **Chao et al** disclose switch size of "N" and an "n" number of ports in each crosspoint chip/crossbar switch units; for an NxN switch ( $N^2$ ) and nxn ( $n^2$ ) crosspoint chips when  $L^2 = N^2/n^2$ , therefore,  $L = N/n$  (all natural numbers), which is the size of a group (col. 17 lines 5-10; fig. 9 & 30). As an example, from figure 9, assume there are 4 groups of VOQs 910a-d, 4 switch modules (large squares

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inside 922a), and within each switch module, there are 4 crosspoint/crossbar switch units; and therefore,  $L = 4$ .

Consider claim 6, **Chao et al** disclose an arbitration method of a matrix switch including a plurality of input ports (fig. 9 items 910), crosspoint/crossbar switch units (col. 18 lines 35-40; fig. 13 items 926), a buffer (col. 18 lines 42-44; fig. 13 sect. 1304), and output ports (fig. 9 items 930) comprising:

(a) a grant arbiter of the crosspoint unit selects (inherently after searching) a winning first-requested request from input signals of the input ports (col. 18 lines 18-23; fig. 11 items 1110 & 1120)

(b) input arbiter sends request to output/grant arbiter to determine whether a (additional) head-of-line cell of a VOQ buffer can be granted for output at output port (col. 16 lines 12-13/34-45; col. 20 lines 31-46)

(c) output arbiter sends grant signal to input/accept arbiter when a cell is buffered (col. 16 lines 56-57; col. 18 lines 16-23)

(d) input arbiter (as accept arbiter) of crosspoint unit perform arbitration to select a (first) grant signal from a multiple set of grant signals (col. 16 lines 57-59; fig. 9 item 920)

(e) input arbiter sends accept signal to winning output according to grant signal (col. 16 lines 59-60)

Consider claim 8, and as applied to claim 6, **Chao et al** further disclose the utilization of *dual* Round Robin to selecting/searching winning (therefore, highest priority) value in grant, accept and output arbitrations in steps a, d and f (col. 16 lines 22-33; fig. 11 items 1110, 1120; *abstract*).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al (U.S. Pat 6,667,984 B1)** in view of **Wang et al (U.S. Pub 2004/0083326 A1)**

Consider claim 4, and as applied to claim 3, **Chao et al** disclose  $n = 4$  output and input arbiters (with grant and accept capabilities respectively – col. 16 lines 46-60) for 4 groups of input ports, each with  $n = 4$  VOQs in figure 11 and crosspoint units are controlled by input/output port controllers (col. 20 lines 21-33). However, **Chao et al** did not explicitly disclose the grant arbiter receives  $n$ -bit request signal vector from VOQ and transmits an  $n$ -bit grant signal vector to the accept arbiter; and the accept arbiter receives the  $n$ -bit grant signal vector, and transmits an  $n$ -bit accept signal vector to the crossbar switch controller. **Wang et al** disclose in figure 3 a group of VOQs sending  $N$ -bit request (signal) vector to a grant arbiter inside a scheduler (as controller) of a crossbar switch and an  $N$ -bit grant (signal) vector to an accept arbiter (paragraphs 0047 lines 1-16 & 0050; *abstract*); the accept arbiter then transmits the  $N$ -bit accept vector to decision register (paragraph 0048; fig. 4). It would have been obvious to one of ordinary skill in the art to incorporate the teachings as taught by **Wang et al**, in the matrix switch of **Chao et al**, for achieving the same goal.

Claims 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al (U.S. Pat 6,667,984 B1)** in view of **Wang et al (U.S. Pub 2004/0083326 A1)** and in further view of **Van Wageningen et al (U.S. Pub 2002/0150121 A1)**.

Consider claim 5, and as applied to claim 4, **Chao et al**, as modified by **Wang et al**, disclose both input and output controls comprise queue(buffer) management process

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(fig. 12 item 1250; fig. 15 item 1520) to send request signals to output arbitration/arbiter when a cell is in line in figure 11 item 1120 (col. 20 lines 9-24). However, **Chao et al** may not have explicitly mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs 0035 & 0043; figs. 3 & 4; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al**, as modified by **Wang et al**, for determining queue priority.

Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al (U.S Pat 6,667,984 B1)** in view of **Van Wageningen et al (U.S Pub 2002/0150121 A1)**.

Consider claim 7, and as applied to claim 6, **Chao et al** disclose output arbitration/arbiter process for each output port uses the crosspoint units to select the winning (highest priority) "first" request signal (col. 17 lines 39-55). However, **Chao et al** may not have explicitly mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs 0035 & 0043; figs. 3 & 4; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending

an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al**, for determining queue priority.

Consider claim 9, and as applied to claim 8, **Chao et al** further disclose updating (new/greater) highest priority of selected output port from input arbitration/arbiter (as accept arbiter) based on a grant signal as well as updating crosspoint units on highest priority and stores values in a column priority value register – CPR (col. 16 lines 41-57; col. 31 lines 40-63; col. 32 lines 60-67). However, **Chao et al** may not have explicitly mention the output arbiter sending an accept signal to a selected crossbar switch unit. **Van Wageningen et al** disclose an output arbiter accepts inquiries from a switching controller in a switch matrix and routes/sends an identifier to inform acceptance (paragraphs 0035 & 0043; figs. 3 & 4; *abstract*). It would have been obvious to one of ordinary skill in the art to incorporate the teachings of an output arbiter sending an accept signal to a selected crossbar switch unit as taught by **Van Wageningen et al**, in the method of **Chao et al**, for determining queue priority.

Claim 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chao et al** (U.S. Pat 6,667,984 B1) in view of **Van Wageningen et al** (U.S. Pub 2002/0150121 A1) and in further view of **McKeown** ("*The iSLIP Scheduling Algorithm for Input-Output Switches*").

Consider claim 10, and as applied to claim 9, **Chao et al**, as modified by **Van Wageningen et al**, disclose the claimed invention except explicitly mentioning an accept arbiter updating a preset highest priority ranking value by adding 1 to output port

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information matched with a grant signal, and the accept arbiter updating the highest priority ranking adding 1 to input port information and crossbar switch unit information corresponding to an accept signal. **McKeown** disclose an accept arbiter increments by one a (preset) highest priority (ranking) value with pointers  $g_i$  (grant) and  $a_i$  (accept) to an output matched with a grant signal; also to input and a crossbar switch unit (pg. 199 left-col. steps 2 & 3 in *IX. Implementing iSLIP*, pg. 196 left-col. steps 2 & 3; fig. 20 & 21). It would have been obvious to one of ordinary skill to incorporate the teachings as taught by **McKeown**, in the method of **Chao et al**, as modified by **Van Wageningen et al**, for achieving the same goal.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A.) **McKeown (U.S Pat 6,212,182 B1)** disclose unicast and multicast scheduling

B.) **Hachinota (U.S Pub 2001/0007563 A1)** disclose a connection request signal in an MxN crossbar switch that can be output slower to avoid contention and save buffer spaces.

C.) **Boduch et al (U.S Pub 2004/0085967 A1)** disclose Wrapped Wave Front Arbiter (WWFA) with reserved bandwidth.

Any response to this Office Action should be **faxed to (571) 273-8300 or mailed to:**

Commissioner for Patents  
P.O. Box 1450

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Alexandria, VA 22313-1450

**Hand-delivered responses should be brought to:**

Customer Service Window  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xavier Szewai Wong whose telephone number is 571-270-1780. The examiner can normally be reached on Monday through Friday 8 am - 5 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema S Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call (800) 786-9199 (IN USA OR CANADA) or (571) 272-1000.

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*Xavier Szewai Wong*

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24<sup>th</sup> June 2007

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